## WHAT IS CLAIMED IS:

 A process for the lost pattern casting of metals, said process comprising the steps of:

forming a pattern from a material;

forming an erodable coating around at least a portion of said pattern to form a mold, said coating comprising a particulate material and a binder;

removing said pattern from said mold;
delivering molten metal into said mold;
contacting said mold with a solvent;

cooling said molten metal such that it at least partially solidifies to form a casting; and

removing at least a part of said mold.

- A process according to claim 1, wherein said material for forming said pattern comprises foam.
- A process according to claim 1, wherein said step of delivering a molten metal into said mold and said step of removing said pattern from said mold occur approximately simultaneously.
- 4. A process according to claim 1, further comprising the step of forming an erodable backing around at least a portion of said erodable coating, said erodable backing comprising a particulate material and a binder.
- 5. A process according to claim 4, further comprising the steps of: contacting said erodable backing with a solvent; and removing at least a part of said erodable backing.
- 6. A process according to claim 4, wherein a weight percent of said binder in said erodable coating is greater than a weight percent of said binder in said erodable backing.

- 7. A process according to claim 1, wherein said particulate material comprises a material of low heat diffusivity selected from the group consisting of cenospheres; crushed pumice particles; silica sand; ceramic, glass and refractory microbubbles; perlite; and mixtures thereof.
- 8. A process according to claim 1, wherein said binder comprises a component selected from the group consisting of phosphate glass, inorganic silicates, borates, phosphates, sulfates, organic binders, and mixtures thereof.
- 9. A process according to claim 1, wherein said step of forming an erodable coating around at least a portion of said pattern to form a mold is performed by dipping said pattern into a slurry comprising said coating.
- 10. A process according to claim 1, further comprising the step of attaching a gate to said pattern.
- 11. A process according to claim 10, wherein the step of delivering molten metal into said mold is performed by delivering molten metal through said gate.
- 12. A process according to claim 1, wherein said binder is free of water and hydrocarbons.
- 13. A process according to claim 1, wherein said binder is soluble in said solvent.
- 14. A process according to claim 1, wherein said solvent comprises water.
- 15. A process according to claim 1, wherein said step of contacting said mold with a solvent comprises the step of spraying the solvent.
- 16. A process according to claim 1, wherein said mold is permeable to said solvent.

- 17. A process according to claim 1, wherein said step of contacting said mold with a solvent comprises the step of delivering the solvent to said mold in an amount of from 0.5 to 50 liters per second and at a pressure from 0.03 to 70 bar.
- 18. A process according to claim 1, wherein said solvent contains at least one of a grit and a surfactant.
- 19. A process according to claim 1, wherein the steps of removing at least a portion of said mold and cooling the molten metal are performed approximately simultaneously.
- 20. A process according to claim 1, wherein said step of cooling comprises contacting a shell of solidifying metal around said molten metal with said solvent.
- 21. A process according to claim 1, wherein said step of cooling comprises the step of using an already cooled portion of the casting as a chill to remove heat from a still molten portion of the casting.
- 22. A process according to claim 1, wherein said steps of (i) contacting said mold with a solvent; (ii) cooling said molten metal such that it at least partially solidifies to form a casting; and (iii) removing at least a part of said mold; are performed by lowering said mold into a bath of said solvent.
- 23. An assembly for the lost pattern casting of metals, said assembly comprising a mold, at least a portion of which comprises an erodable aggregate formed from a particulate material and a binder.
- 24. An assembly according to claim 23, said assembly further comprising an erodable backing at least partially surrounding said mold, wherein said backing comprises an aggregate and a binder.

- 25. An assembly according to claim 24, wherein a weight percent of binder in said mold is greater than a weight percent of binder in said backing.
- 26. An assembly according to claim 23, wherein said particulate material comprises a material selected from the group consisting of cenospheres; crushed pumice particles; silica sand; ceramic, glass and refractory microbubbles; perlite; and mixtures thereof.
- 27. An assembly according to claim 23, wherein said binder is free of water and hydrocarbons.
- 28. An assembly according to claim 23, wherein said binder is soluble in water.
- 29. An assembly according to claim 23, wherein said mold is permeable to water.
- 30. An assembly according to claim 23, further comprising a pattern, wherein said mold is positioned around at least a portion of said pattern.
- 31. An assembly according to claim 30, further comprising a gate attached to said pattern.
- 32. An assembly according to claim 30, wherein said pattern comprises polystyrene.
- 33. An assembly according to claim 23, wherein said binder comprises a component selected from the group consisting of phosphate glass, inorganic silicates, borates, phosphates, sulfates, organic binders, and mixtures thereof.
- 34. An assembly according to claim 23, further comprising a nozzle for delivering a solvent to contact said mold.

35. An apparatus for the lost pattern casting of metals whereby a lost pattern mold is at least partially eroded and said casting is cooled and solidified by contact with a solvent, said apparatus comprising:

an erodable lost pattern mold;

an erodable backing at least partially surrounding and supporting said mold; and

a nozzle for delivering a solvent to contact at least a part of said mold and said backing.

- 36. An apparatus according to claim 35, wherein said mold comprises an aggregate and a binder.
- 37. An apparatus according to claim 35, wherein said backing comprises an aggregate and a binder.
- 38. An apparatus according to claim 35, wherein said nozzle is configured to deliver said solvent in an amount of from 0.5 to 50 liters per second and at a pressure from 0.03 to 70 bar.
- 39. An apparatus according to claim 35, comprising a plurality of nozzles.
- 40. An apparatus according to claim 39, wherein said plurality of nozzles deliver two or more different solvents.
- 41. An apparatus according to claim 39, wherein said plurality of nozzles deliver solvent at two or more different temperatures, pressures or rates.
- 42. An apparatus according to claim 35, wherein said nozzle is configured to deliver solvent at a pressure and rate such that a shell of solidifying metal is formed around a metal casting in said mold prior to said solvent contacting said casting.

- 43. An apparatus according to claim 35, wherein said nozzle is configured to deliver solvent beginning at a base of said mold and progressing to a top of said mold.
- 44. A process for the lost pattern casting of metals, said process comprising the steps of:

forming a pattern from a material;

forming a coating around at least a portion of said pattern to form a mold;

forming an erodable backing around at least a portion of said mold;

removing said pattern from said mold;

delivering molten metal into said mold;

contacting said erodable backing with a solvent to erode at least a part of said backing;

cooling said molten metal such that it at least partially solidifies to form a casting; and

removing said coating.

45. A process according to claim 44, wherein said steps of (i) contacting said erodable backing with a solvent to erode at least a part of said backing; and (ii) cooling said molten metal such that it at least partially solidifies to form a casting; are performed by lowering said mold into a bath of said solvent.